



By Express Mail #EL350350373US

Attorney Docket No.: 4100-178



Check box if applicable: ☐ DUPLICATE

## UTILITY PATENT APPLICATION TRANSMITTAL

*Submit an original and a duplicate for fee processing*

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Assistant Commissioner for Patents  
BOX PATENT APPLICATION  
Washington, DC 20231

Dated: November 1, 1999

Sir:

Transmitted herewith for filing is the utility patent application of:

Inventor(s): Harald NAUHEIMER, Anton HUF

For: Electromechanical Drive For Track-Laying Vehicles

Enclosed are:

- Transmittal letter (2x) with Fee Computation Sheet
- General Authorization For Payment of Fees (2x)
- Title Page, Specification, Claims 1 to 7 & Abstract (11 pages)
- Unexecuted Declaration and Power of Attorney (3 p.)
- 3 sheet(s) of drawing(s) (Figs. 1 to 3)
- Check for \$ 760 for filing fee
- Information Disclosure Statement
- PTO Form 1449 with copies (3 docs.) of cited references
- Return Receipt Postcard

☐ Please charge my Deposit Account No. 03-2412 in the amount of \$. A duplicate copy of this sheet is enclosed.

☒ The Commissioner is hereby authorized to charge payment of the following fees associated with this application or credit any overpayment to Deposit Acct. No. 03-2412.


☒ Any additional filing fees required under 37 CFR 1.16.

☒ Any patent application processing fees under 37 CFR 1.17

- ☒ The issue fee set in 37 CFR 1.18 at 3 months from mailing of the Notice of Allowance, pursuant to 37 CFR 1.311 (b) provided the fee has not already been paid by check.
- ☒ Any filing fees under 37 CFR 1.16 for presentation of extra claims.

☒ Priority is claimed for this invention and application, corresponding applications having been filed in **Germany** on **November 03, 1998**, No. **198 50 606.6**.

Respectfully submitted,  
COHEN, PONTANI, LIEBERMAN & PAVANE

By:   
Thomas C. Pontani  
Reg. No. 29,763

551 Fifth Avenue, Suite 1210  
New York, New York 10176  
Tel: (212) 687-2770  
Fax: (212) 972-5487

By Express Mail # EL350350373US

**APPLICATION FOR UNITED STATES  
LETTERS PATENT**

**ELECTROMECHANICAL DRIVE FOR TRACK-LAYING VEHICLES**

Inventor(s):

**Harald NAUHEIMER  
Anton HUF**

## **BACKGROUND OF THE INVENTION**

### **1. Field of the Invention**

The invention relates track laying vehicles, and more particularly to an electromechanical drive for track-laying vehicles.

### **2. Description of the Related Art**

It is known that electric drives for track-laying vehicles, compared with conventional, fully automatic, hydromechanical power-shift transmissions, permit increased flexibility in the component arrangement as well as a more favorable energy management of the vehicle with infinitely variable traction drive. The high demands made on the traction motor and on the power electronics in purely electric drives-without mechanical shift stages-leads to electric motors of large diameters. These motors require a lot of construction space and can only be arranged in vehicles to a limited extent.

Avoiding these disadvantages has led to the development of electromechanical drives. German Patent No. 37 28 171 C2 shows an electromechanical drive block which has an electric motor for the traction drive (traction motor), which is connected in each case to track drive sprockets via differential gear units. The effort of construction of the electric traction drive is drastically reduced by the interposition of a 2-speed gear unit. For the regenerative steering, however, a further electric motor (steering motor) and a mechanical zero shaft which transmit the mechanical output from the one to the other drive side, are necessary. The controlled supply of energy to both electric motors (traction and steering motors) is effected in a purely electrical manner via a generator driven by an internal combustion engine.

## SUMMARY OF THE INVENTION

An object of the present invention is to provide a more highly integral, more compact drive which retains the aforementioned advantages.

5 This and other objects are achieved in accordance with of invention by the realization of a comparatively short overall length of the drive unit by the coaxial arrangement of a plurality of components in the same plane, and by the integration of further elements in the interior space of the rotor of an electric motor.

10 Due to the mechanical gear stages, it is possible to revert to electric motors which have a smaller output and a substantially smaller diameter. As a result, it is possible, for example, to coaxially drive a side transmission gear of the track drive sprocket attached to the rear hull end of the vehicle. As a result, an additional gear unit for compensating for axial misalignment may be dispensed with.

On account of the short installation length, an access opening, for example, may be provided for the free space between the two drives.

15 Since the friction brake is arranged of the outside on the output shaft, the braking power which is required by the tracks is absorbed directly and the brake can easily be cooled by ambient air. A further advantage of this arrangement is the ease of maintenance of the brake. The construction of the drive unit permits both electrical and mechanical-hydraulic actuation of the friction brake and of the clutches for the gear-change operations. When travelling around  
20 curves, motors on the inside of the curve work as generators, which supply energy to the motors on the outside of the curve via power electronics, as a result of which regenerative steering is possible. The flexibility of the arrangement of the drive components compared with the prior art is further increased in an advantageous manner by the invention.



## **BRIEF DESCRIPTION OF THE DRAWINGS**

In the drawings wherein like reference numerals depict similar elements throughout the views:

Fig. 1 shows the basic schematic construction of a drive according to an exemplary embodiment of the invention;

Fig. 2 is a half sectional view of an exemplary embodiment of the drive of the present invention; and

Fig. 3 is a schematic view of the basic arrangement of the drive element in a vehicle according to an embodiment of the invention.

100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000

## **DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS**

The basic construction of an exemplary embodiment of a drive according to the invention is shown in Fig. 1. An electric motor 1 drives the ring gear of an epicyclic gear unit 2, which is provided as a reducing fixed stage. The output of epicyclic gear unit 2 is effected via its revolving web, which, with clutch 5 closed and at the same time clutch 6 open, directly drives the output shaft 20 of the drive. By controlled and thus matched opening of the clutch 5 and closing of the clutch 6, the epicyclic gear unit 2 drives the sun gear of an epicyclic gear unit 3. Since this epicyclic gear unit 3, in this set-up, drives the output shaft 20 via its web. A further gear stage is thus connected in which the revolving planet gears are rotatably mounted.

The brake 4 is firmly connected to the output shaft 20 and the web of the epicyclic gear unit 3, but lies coaxially on the outside and partly encloses the epicyclic gear unit 3 and the clutch 6.

According to an exemplary embodiment of the invention, the first gear stage 2 and clutch 5 are arranged in the interior of the electric motor 1 and spatially in series next to the coaxially arranged elements in approximately the same plane-i.e., epicyclic gear unit 3, clutch 6 and brake 4. The brake 4 lying on the outside close to the output can be cooled in a simple manner and is arranged such that it is easy to maintain. It is intended as a parking brake and is connected to the operating brake in order to meet the demand for maximum braking power. In addition, brake 4 performs the task of an auxiliary brake in the event of failure of another braking system.

The drive described is flange-mounted inside a vehicle to its side wall 9. The output shaft 20 outside the vehicle drives a track sprocket 8 via a transmission gear 7.



A horizontal half section of an exemplary embodiment is shown in Fig. 2. A cup-shaped controllable external-rotor motor 1' can be seen, which drives the ring gear of an epicyclic gear unit 2' and can be optionally coupled in a rotationally locked manner to the output shaft 20' via a multiple-disc clutch 5'. The external-rotor motor 1' thus drives a transmission gear 7' via a fixed gear stage of the epicyclic gear unit 2'. The transmission gear 7' (only partly shown) drives a track sprocket 8' (only depicted in outline).

According to the invention, the arrangement of the epicyclic gear unit 2' and the multiple-disc clutch 5' in the interior can be seen from the enclosure by the cup-shaped external-rotor motor 1'.

A further gear stage of the drive is possible by a shift operation described with reference to Fig. 1, the output shaft 20' being driven via a further multiple-disc clutch 6' and a further epicyclic gear unit 3'. The coaxial arrangement of the epicyclic gear unit 3', of the multiple-disc clutch 6' and of the friction brake 4', in approximately the same plane in series laterally next to the external-rotor motor 1', can likewise be seen.

The basic arrangement of the drive elements in a vehicle 10, which moves in the direction of travel V, is shown in Fig. 3. The same parts which occur on both drive sides have been provided with the same reference numerals. Shown symbolically in the front region of the vehicle 10 is an internal combustion engine 13, which drives a generator 14. Shown as an alternative multi-motor concept in the rear side region of the vehicle 10 are two smaller power generating units 15a, 15b, which are arranged, for example, above the track run. The rear drive, in this exemplary embodiment of the vehicle 10 consists of electric traction motors 17, which, by means of multispeed gear units 18, drive final drives having track sprockets 16. In order to

meet the demand for maximum braking power as a locking brake when parking, and as an auxiliary brake, each drive is provided with an outer brake 19. In this exemplary embodiment, instead of a second drive for the track 11, in each case a track-deflection roller 12 is installed. This may also be designed the other way round by the drive being effected from the front and by the track-deflection rollers 12 being attached to the rear end of the vehicle 10. Likewise, it is possible to drive a chain 11 in each case at the front and the rear.

As the above description and in particular the drawings show, an essential characterizing feature of the invention consists in the fact that some elements, in the case of an internal-rotor motor, are arranged inside a rotor rotating in the fixed stator and in that, when an external-rotor motor is used, although the elements are likewise arranged inside the external rotor, they are at the same time also arranged inside the fixed internal stator (Fig. 2).

The invention is not limited by the embodiments described above which are presented as examples only but can be modified in various ways within the scope of protection defined by the appended patent claims.

## CLAIMS

We I claim:

1           1.       A drive for track laying vehicles comprising:  
2           an electric traction motor having a rotor;  
3           at least one variable speed mechanical gear stage; and  
4           at least one brake;  
5           wherein at least one of said gear stage and said brake are arranged inside the  
6 rotor of the electric motor and the other of said gear stage and said brake are arranged laterally  
7 outside the electric motor so as to be arranged coaxially therewith and in substantially the same  
8 plane.

1           2.       The drive in accordance with claim 1, wherein said electric traction  
2 motor further comprises an internal and external rotor.

1           3.       The drive in accordance with claim 1, wherein said electric traction  
2 motor is operable to allow brief operation close to a motor cut-off output.

1           4.       The drive in accordance with claim 1, further comprising:  
2           a first epicyclic gear unit acting as a fixed stage;  
3           a second epicyclic gear unit driven by said first epicyclic gear unit; and  
4           a plurality of multiple-disc clutches operably connected to said second epicyclic  
5 gear and having an output shaft operably connected with said at least one brake;  
6           wherein said electric traction motor comprises an external-rotor motor, and  
7           wherein one of said first and second epicyclic gears and one of said plurality of multiple-disc

8 clutches are arranged one behind the other in an interior region of the external-rotor motor,  
9 and the other of said first and second epicyclic gears and another of said plurality of multiple-  
10 disc clutches are arranged to lie outside the external-rotor motor coaxially in a plane with said  
11 at least one brake in a radial direction from said external-rotor motor.

1 5. The drive in accordance with claim 1, further comprising a plurality of  
2 gear stages, and a plurality of clutches, wherein at least one gear stage and at least one clutch  
3 are arranged in an interior of the electric motor, and wherein at least another of said gear  
4 stages and said clutches in addition to said at least one brake are arranged coaxially with  
5 respect to each other in the same plane outside said electric motor.

1 6. The drive in accordance with claim 1, further comprising a plurality of  
2 gear stages and a plurality of clutches, wherein two of said plurality of gear stages and at least  
3 one of said plurality of clutches are arranged in an interior of said electric motor, and wherein  
4 at least another of said clutches and said at least one brake are coaxially arranged in the same  
5 plane outside said electric motor.

1 7. The drive in accordance with claim 1, wherein said at least one brake is  
2 arranged outside the electric motor in a radial direction therefrom.

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2
--	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	---

5

FIG. 1 is a schematic diagram of a system for controlling a vehicle's engine. The system includes a microcontroller (1) which is connected to a sensor (2) and an actuator (3). The microcontroller (1) is also connected to a memory (4) and a display (5). The sensor (2) is connected to the microcontroller (1) via a signal line (6). The actuator (3) is connected to the microcontroller (1) via a control line (7). The microcontroller (1) is connected to the memory (4) via a data line (8). The display (5) is connected to the microcontroller (1) via a video line (9).

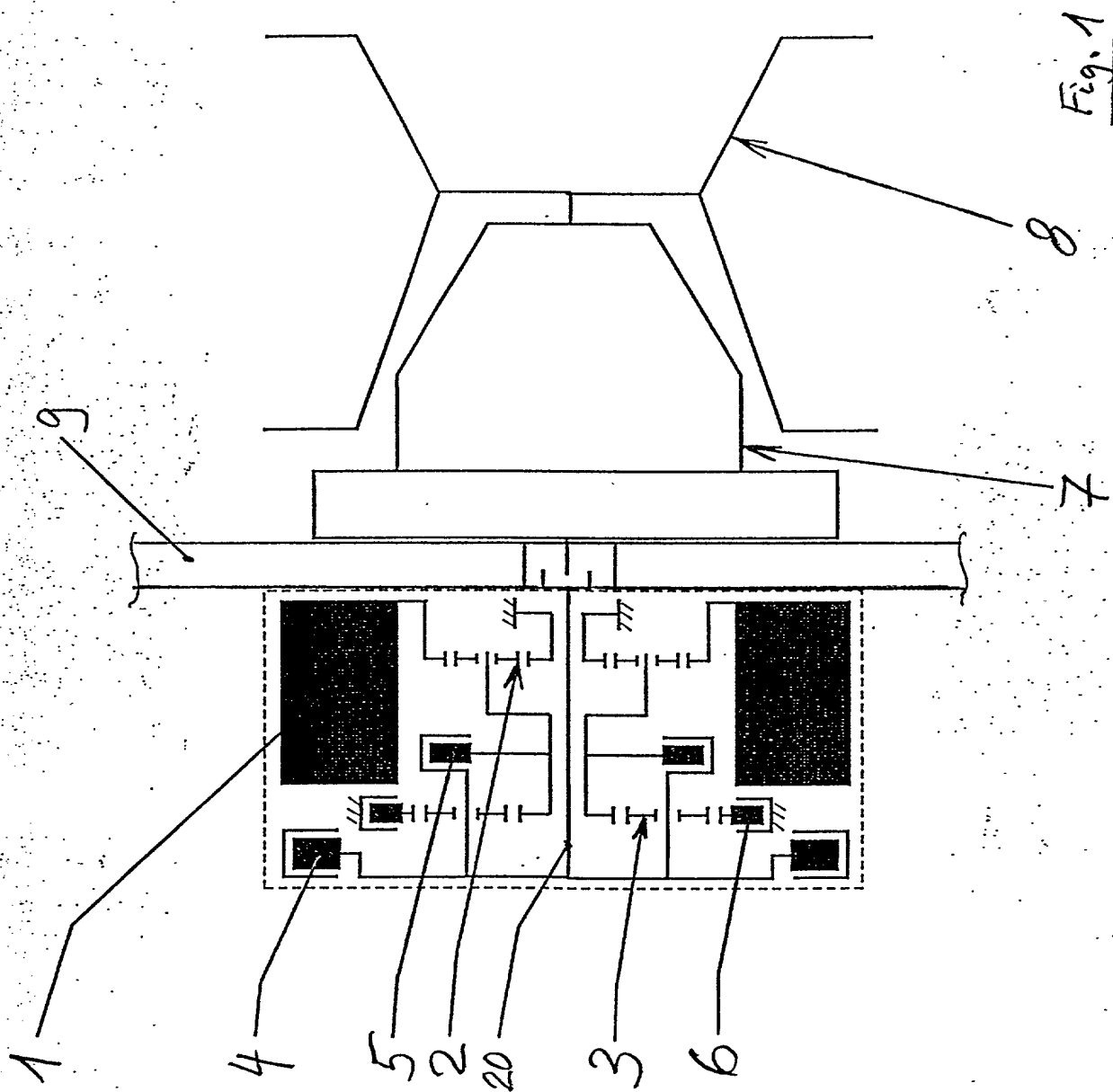


Fig. 1

FIG. 2 is a cross-sectional view of the device shown in FIG. 1, taken along the line 2-2 of FIG. 1, and showing the internal components of the device, including the pump, the motor, the control system, and the various valves and passages.

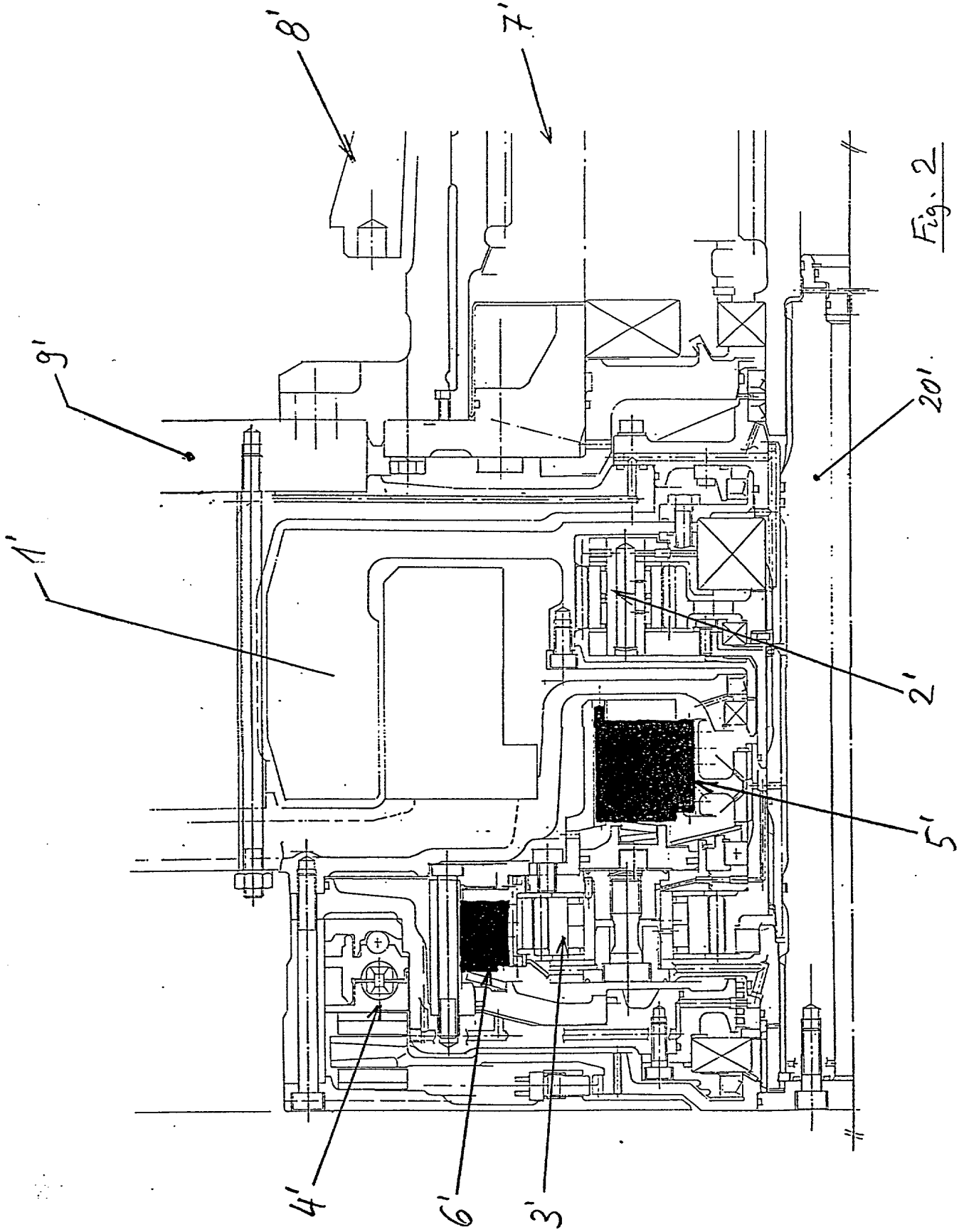


Fig. 2

FIG. 3 is a schematic diagram of a system for measuring the velocity of a moving object. The system includes a moving object 10, a sensor 11, a control unit 12, and a display unit 13. The sensor 11 is positioned to detect the position of the moving object 10. The control unit 12 is connected to the sensor 11 and the display unit 13. The display unit 13 displays the measured velocity of the moving object 10. The system is shown in a cross-sectional view, with the moving object 10 moving along a track 14. The sensor 11 is located on the track 14, and the control unit 12 is located below the track 14. The display unit 13 is located to the right of the control unit 12. The system is shown in a simplified manner, with the moving object 10 represented by a rectangle and the sensor 11 represented by a small rectangle. The control unit 12 is represented by a larger rectangle, and the display unit 13 is represented by a small rectangle. The track 14 is represented by a horizontal line. The velocity of the moving object 10 is indicated by an arrow labeled V.

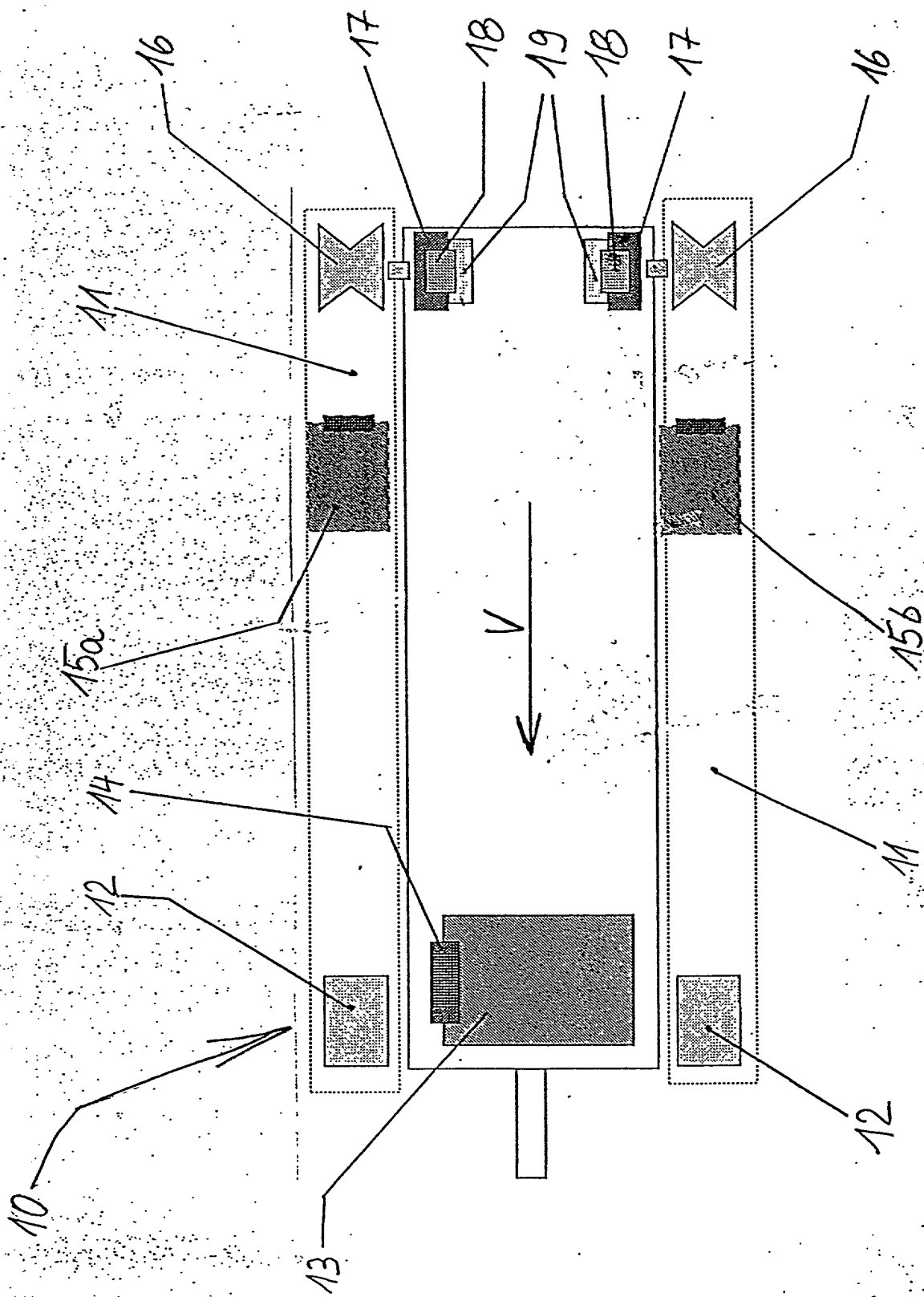


Fig. 3



## DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

### ELECTROMECHANICAL DRIVE FOR TRACK-LAYING VEHICLES

the specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I also acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37 CFR 1.63(d), which occurred between the filing date of the prior application and the filing date of the continuation-in-part application, if this is a continuation-in-part application.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

<b>Prior Foreign Application:</b>	<b>Country:</b>	<b>Germany</b>
	<b>Appl. No.:</b>	<b>198 50 606.6</b>
	<b>Filed:</b>	<b>November 03, 1998</b>

I hereby appoint the following attorneys and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

MYRON COHEN, Reg. No. 17,358; THOMAS C. PONTANI, Reg. No. 29,763; LANCE J. LIEBERMAN, Reg. No. 28,437; MARTIN B. PAVANE, Reg. No. 28,337; MICHAEL C. STUART, Reg. No. 35,698; KLAUS P. STOFFEL, Reg. No. 31,668; EDWARD M. WEISZ, Reg. No. 37,257; CHI K. ENG, Reg. No. 38,870; JULIA S. KIM, Reg. No. 36,567; VINCENT M. FAZZARI, Reg. No. 26,879; ALFRED W. FROEBRICH, Reg. No. 38,887; ANDRES N. MADRID, Reg. No. 40,710; KENT H. CHENG, Reg. No. 33,849; GEORGE WANG, Reg. No. 41,419; JEFFREY M. NAVON, Reg. No. 32,711 and JOHN G. TUTUNJIAN, Reg. No. 39,405.

Address all telephone calls to Thomas C. Pontani, Esq. at telephone No. (212) 687-2770.

Address all correspondence to:

Thomas C. Pontani, Esq.  
Cohen, Pontani, Lieberman & Pavane  
551 Fifth Avenue, Suite 1210  
New York, New York 10176

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

**Full Name of Sole or First Inventor: Harald NAUHEIMER**

Inventor's signature: \_\_\_\_\_

Dated: \_\_\_\_\_  
Month/Day/Year

Residence: **Walther-Heim-Strae 14  
D-86161 Augsburg, Germany**

Citizenship: **Germany**

Post Office Address: **Walther-Heim-Strae 14  
D-86161 Augsburg, Germany**

Inventor's signature: \_\_\_\_\_

**Residence:            Stadtberger Straße 73  
                              D-86157 Augsburg, Germany**

Post Office Address: **Stadtberger Straße 73**  
**D-86157 Augsburg, Germany**

[illegible]